Performance Work Statement (PWS)

For

Remote Sensing – Scientific and Engineering Support Services

13 March 2013

STATEMENT OF WORK

Remote Sensing – Scientific and Engineering Support Services

1.0 BACKGROUND

1.1 Introduction

The Remote Sensing Division, NRL Code 7200, has an active program of research in the remote sensing, modeling, and scientific analysis of the Earth's atmosphere and ocean and land surfaces. The Division designs, tests and operates space-based, air-based and surface-based sensors, and develops new remote sensing capabilities and new ways of analyzing data. Current projects include: spectral imaging for the remote sensing of coastal water and of land surfaces; passive polarimetric microwave sensing of the ocean surface (Windsat, APMIR, and follow-on sensors); passive near ultraviolet (NUV), visible (VIS), near-infrared (NIR) and passive microwave (PMW) sensing of the atmosphere; synthetic aperture radar (SAR); radio, IR and optical astronomy; lidar sensing of the atmospheric boundary layer; passive sensing of direct and diffuse near-surface sunlight; and laboratory and field studies of aerosols, foam and bubbles, and fluid flow. The Division performs modeling, field and laboratory experiments, calibrates and validates sensors, carries out feasibility studies, and performs simulations and scientific analyses.

1.2 Scope of Work

The purpose of this Statement of Work (SOW) is to acquire scientific and engineering R&D services to support the Remote Sensing Division's (RSD) formulation, design, development, fabrication, integration, testing, verification, operation, and data analysis of laboratory, field and spaceflight and ground system hardware and software, including the development and validation of technologies to enable future science missions. Tasks may range from supporting mission concept design and feasibility analyses through to the laboratory, in-field or flight (including on-orbit operation) of deployed systems, the analysis of engineering data obtained from them, and the development and operation of algorithms for analyzing data. The requirement includes providing on/off-site multi-disciplinary scientific, engineering and management services to support the development, implementation and use of components, subsystems, systems, and scientific instruments for NRL laboratory and field experiments. "Field experiments" may include ground-based experiments, in-water experiments, experiments on spacecraft, and experiments on suborbital craft such as UAVs, balloons, and aircraft.) Hardware to be developed may include instruments, Ground Support Equipment (GSE), simulators, non-flight models and prototypes.

Services may include feasibility studies, systems definition studies; systems engineering; analysis; preliminary and detailed design; fabrication; assembly; integration and test; instrument integration, validation and calibration; test instrumentation; laboratory and field operation of equipment; research and technology unique to the intended use; phenomenology; data reduction; documentation; maintenance; sustaining engineering; configuration management; system safety and, reliability, and quality assurance (SR&QA); architectural trades; performance, cost, and risk assessment; and the development of algorithms for analyzing data from instruments that were not developed under this SOW. Services may also include support for Information Technology (IT) and Information Assurance (IA) activities.

2.0 GENERAL REQUIREMENTS

The requirement includes providing technical and scientific support within the scope of this SOW. Task deliverables will consist of any instruments or mounts that are fabricated under this SOW, documentation and data as defined by the Contract Data Requirements List (CDRL) of the base contract. The tasks may involve activities both on-site (at NRL) and off-site, and may require extensive travel as defined in each task order issued.

2.1 Non-Personal Services

The Government will neither supervise Contractor employees nor control the method by which the Contractor performs the required tasks.

The Government will not assign tasks to, or prepare work schedules for, individual Contractor employees.

The Contractor **shall** be responsible for managing its employees and guarding against any actions that are of the nature of personal services, or give the perception of personal services as defined in FAR-Part 37, Service Contracting, dated 31 May 2011.

The Contractor **shall** notify the Contracting Officer (KO) if any Government requested actions constitute, or are perceived to constitute personal services.

2.2 Business Relations

The Contractor **shall** integrate and coordinate all activity needed to execute this contract.

2.3 Contract Administration and Management

The following subsections specify requirements for contract management and Contractor personnel administration

2.3.1 Contract Management

The Contractor **shall** establish clear organizational lines of authority and responsibility to ensure effective management of the resources assigned to this contract.

The Contractor **shall** not incorporate proprietary hardware or software in any deliverable developed under this contract unless authorized, in writing, by the Contracting Officer.

2.3.2 Personnel Administration

The Contractor **shall** provide all personnel, resources and materials necessary to provide the support required.

The Contractor **shall** provide for employees during designated Government non-work days or other periods where Government offices are closed due to weather, security or other special conditions.

The Contractor **shall** maintain the proficiency of their employees by providing initial and refresher training as required to meet the SOW requirements.

The Contractor **shall** make necessary travel arrangements for employees.

2.3.3 Contract Administration

The Contractor **shall** establish processes and assign appropriate resources to effectively administer this contract.

The Contractor **shall** respond to Government requests for contractual actions within five work days.

The Contractor **shall** assign work effort and maintain proper and accurate time keeping records of personnel assigned to work on this contract.

2.4 Contractor Furnished Equipment, Materials, Subcontracts and Supplies

Equipment and unexpended materials and supplies purchased by the Contractor under this contract become the property of the Government at the end of the performance period, including all options.

The Contractor **shall** provide equipment, materials, and supplies, not furnished by the Government (See Section 4.4, Government Furnished Materials), but required to perform the work defined under Section 3, Performance Requirements.

The Contractor **shall** be responsible for any subcontract management necessary for performing efforts described in Section 3, Performance Requirements.

2.5 Travel / Temporary Duty (TDY)

Travel to other government facilities or Contractor facilities may be required for conduct of experimental research or attendance at government reviews or scientific meetings and seminars.

The Contractor **shall** submit all travel requirements (including plans, agenda, itinerary and dates) for pre-approval to the Government and is on a strictly cost reimbursable basis.

The Contractor **shall** bill costs for travel in accordance with FAR 31.205-46 Travel Costs (subject to local policy & procedures).

3.0 REQUIREMENTS

The Contractor **shall** perform work assignments and provide all necessary personnel and facilities to accomplish the work described below. Specific tasks will be defined through the issuance of task order. Facilities will be provided by the Government for field or laboratory experiments, and for integrating equipment developed under this SOW onto mobile platforms, and for operating it on mobile platforms.

The Contractor **shall** perform mechanical, electronic, and related advanced hardware and software development, along with the integration and testing of advanced subsystems on designated host platforms, and for the development and application of scientific algorithms.

The Contractor **shall** provide technical support for concept and feasibility studies; requirement definition; subsystem and payload design and development; integration and test; and laboratory, field, and in-flight (including on-orbit) or in-water operation of the systems developed under this SOW.

3.1 General Requirements

3.1.1 Facilities and Staffing

The Contractor **shall** provide and staff facilities for the fabrication, test, and storage of unique fixtures and support equipment.

The Contractor **shall** have (i) office space and meeting facilities within the Washington, DC locale; (ii) document duplication and facsimile transmission resources; (iii) graphic and documentation reproduction resources; and (iv) internet connectivity.

The Contractor shall perform analyses and trade studies in support of specific task orders issued under this SOW**. [CDRL A0005]**

The Contractor **shall** participate in periodic and informal working group meetings and discussions held at the direction of NRL.

3.1.2 Program Reviews and Coordination Meetings

The Contractor **shall** support SRRs, PDRs, CDRs, TRRs, and other required technical reviews associated with specific task orders issued under this SOW.

The Contractor **shall** present technical reviews and analyses on the recommended designs associated with specific task orders issued under this SOW. **[CDRL A0007]**

The Contractor **shall** prepare technical review data packages. **[CDRL A007]**

3.1.3 System Integration and Test

The Contractor **shall** provide engineering services to test, mount and integrate instruments, whether GFE or developed under this SOW, to their intended fixed or mobile host platform.

The Contractor **shall** support development of requirements for environmental test of specific experiments, payloads, and subsystems, including mechanical and electrical experimental and functional testing, along with corrective actions where necessary.

The Contractor **shall** develop test plans and procedures for the integration and test of experiments, payloads, and subsystems into an operational payload at NRL or other NRL-designated facilities. **[CDRL A0005, A007]**

The Contractor **shall** assist NRL to perform system level environmental and functional testing, along with corrective actions where necessary.

The Contractor **shall** support integration and test activities including, but not limited to, natural environmental stresses (e.g., thermal, vacuum), EMC, shock and vibration, and calibration.

The Contractor **shall** document the results of subsystem and system level testing. **[CDRL A0005]**

The Contractor **shall** provide scientific expertise, engineering test support, materials, and supplies for NRL scientists and engineers performing special calibrations, and for reducing the resultant data sets. **[CDRL A005]**

The Contractor **shall** develop and maintain calibration requirements documentation for systems developed under this SOW. **[CDRL A0005]**

The Contractor **shall** provide engineering test support and supplies for the integration of flight instruments and experimental payloads with the appropriate host platform or vehicle.

The Contractor **shall** provide post-integration (both pre-launch/deployment and post-launch/deployment) instrument support.

3.1.4 Ground Support Equipment

Ground Support Equipment (GSE) will be needed for characterizing the operation and performance of instrumentation under ambient and stressing conditions, whether that instrumentation is GFE or is developed under this SOW.

The Contractor **shall** design, acquire, modify, and adapt GSE to support payload integration and test. Typical GSE elements will include: electronics for command, control, and data acquisition, and associated interfaces; support structures; wiring harnesses; and supporting design support systems. **[CDRL A005]**

The Contractor **shall** perform technical writing and editing tasks for the design, development, and specification of space and ground hardware and software systems, ground support equipment (GSE), payload and launch processing, and flight operations. **[CDRL A005]**

3.2 Specific Tasks

The Contractor **shall** provide the program management, control, and reporting functions necessary to manage and direct the accomplishment of the efforts required under this SOW.

3.2.1 Task 1— Program Management

The Contractor **shall** provide a single point-of-contact Program Manager (PM) for SOW technical and procedural matters for this contract.

The PM **shall** be cognizant of SOW technical elements and **shall** be responsible for the management of tasks conducted under this SOW.

The PM **shall** interface with the COR, and as necessary, with other Government Representatives and Contractors.

The PM **shall** oversee the efforts of on-site Contractor personnel, and **shall** ensure that tasks are performed according to Task Order SOW requirements.

The Contractor **shall** provide a Monthly Contractor On-Site Labor Report and a Monthly Financial Status Report**. [CDRL A0001]**

The PM **shall** ensure that required documents and deliverables are properly prepared and delivered. **[CDRL A0001, A0002, A0003, A0004, A0005, A0006, A007, A008]**

3.2.2 Task 2 – Information Technology Support

3.2.2.1 Information Assurance Compliance and Information Technology Support

The Contractor **shall** provide Information Technology (IT) systems support for UNIX, Microsoft Windows, Linux, and Macintosh workstations supporting the design, development, and testing process.

The Contractor **shall** provide hardware and software maintenance for selected computational systems.

The Contractor **shall** recommend, acquire, and implement hardware and software solutions, along with additions and upgrades to meet performance and capability needs. **[CDRL A0005]**

The Contractor **shall** support Internet, Intranet, and Extranet technology application using the NRL Integrated Communications Environment Network (NICEnet), and other local area network and wide area network (LAN/WAN) capabilities. **[CDRL A006]**

The Contractor **shall** provide computer system configuration and management, including compliance with Department of Defense, Department of Navy, and NRL information assurance and security policies and requirements. **[CDRL A006]**

The Contractor **shall** maintain system component accountability, manage accounts, manage data backup, and manage scheduled maintenance and maintenance agreements. **[CDRL A006]**

3.2.2.2 Web Services

The Contractor **shall** be responsible for the development, implementation, and maintenance of a variety of web services hosted on NRL computers. **[CDRL A006]**

The Contractor **shall** provide web services both on a project-specific basis and to communicate information on a broader scale to COR-designated parties or to the general public. Web services include: (i) Maintenance of existing web sites and databases, including the design, testing, and implementation of enhancements, adding new modules, and fixing bugs in a short timeframe; and (ii) designing and testing new web sites and databases to support specific program needs.

The Contractor **shall** test and optimize any web services developed for different browser conditions and operating environments.

When tasked, the Contractor **shall** assess the “functionality” of existing websites to determine needed improvements and upgrades. **[CDRL A0005]**

The Contractor **shall** ensure that all web work is in compliance with NRL, Department of Defense, and Government-wide web policies and requirements.

The Contractor **shall** provide for the formatting of media for posting to the websites.

The Contractor **shall** display program documentation, review packages, address listings, program schedules, and other information in a user-friendly manner.

The Contractor **shall** design, configure, implement, and maintain file serving methodologies (both hardware and software), data transfer and communication lines, and networking connectivity between the Contractor’s facility, NRL, and other COR approved locations.

3.2.3 Task 3 – HREP Tasking and Data Analysis

HICO-RAIDS Experiment Payload (HREP) is a combination of two instruments: the Hyperspectral Imager for the Coastal Ocean (HICO) and the Remote Atmospheric and Ionospheric Detection System (RAIDS). HREP is attached to the Japanese Experiment Module – Exposed Facility (JEM-EF) on the International Space Station (ISS).

3.2.3.1 HICO Operations

The Contractor **shall** perform HICO mission operations on a daily basis.

The Contractor **shall** interface with NASA to upload the HICO command schedule to the HICO instrument.

The Contractor **shall** request and download HICO imagery data and state of health (SOH) data from the NASA mission data storage facility at the Marshall Space Flight Center. **[CDRL A005]**

The Contractor **shall** process the HICO imagery data and transmit it to the Remote Sensing Division Coastal and Ocean Remote Sensing Branch (Code 7230) via FTP. **[CDRL A005]**

3.2.3.2 HICO/HREP Coordination

The Contractor **shall** interact and coordinate HREP/HICO activities with the HREP team of the Air Force Space Test Program located at the Johnson Space Center.

The Contractor **shall** perform general troubleshooting and anomaly resolution of the instrument as needed. Troubleshooting and anomaly resolution include, when necessary, requesting an emergency command window to reset the HICO computer in case of a lockup. **[CDRL A007]**

The Contractor **shall** provide periodic technical and progress reports that establish the state of the HREP mission and the SOH and performance of the HICO instrument. **[CDRL A0005]**

The Contractor **shall** support user communities by arranging for equipment demonstrations and tests; configuration and acquisition of new systems; and by providing day-to-day user support.

3.2.4 Task 4 – Passive Microwave Remote Sensing of Sea, Air and Land

The *WindSat* passive microwave radiometer measures brightness temperatures at vertical and horizontal polarizations centered on 5 atmospheric window frequencies between 6 and 37 GHz, and is fully polarimetric at three of these frequencies. The primary objective of WindSat is to demonstrate the feasibility of using passive microwave polarimetry to measure the ocean surface wind vector, as well as other geophysical parameters including sea surface temperature, columnar cloud liquid water, and columnar precipitable water.

APMIR is an airborne passive microwave polarimeter used for calibrating and validating the WindSat measurements and models. WindSat is also serving as a pathfinder for future DoD space-based passive microwave sensors.

Passive microwave remote sensing programs under this SOW will focus on, but not be limited to, APMIR, WindSat and future DoD microwave sensors for remote sensing of land, sea, and air scenes.

3.2.4.1 Passive Microwave Sensor Engineering

The Contractor **shall** provide hardware and software engineering support for the design, development, and operation of passive microwave systems intended for ground, air, and space deployment.

The Contractor **shall** provide RF and electrical engineering support for the development of microwave remote sensing systems.

The Contractor **shall** provide mechanical engineering support for the development of microwave remote sensing systems.

The Contractor **shall** support the integration, test, and calibration of passive microwave remote sensing systems.

The Contractor **shall** design, acquire, modify, and adapt GSE to support payload integration and test. Typical GSE elements will include: electronics for command, control, and data acquisition, and associated interfaces; support structures; wiring harnesses; and supporting design support systems. **[CDRL A005]**

3.2.4.2 Passive Microwave Data Products

The Contractor **shall** develop software for the processing of passive microwave data. Data processing software includes, but is not limited to, conversion of raw passive microwave measurements into calibrated, geolocated brightness temperatures; and retrieval of environmental parameters from brightness temperature data. **[CDRL A006]**

The Contractor **shall** support integration of any data processing software developed into an automated passive microwave processing software suite.

The Contractor **shall** develop software for the analysis of passive microwave data products. Data analysis software includes, but is not limited to, software for sensor calibration, environmental data product validation, geolocation validation, and sensor state of health trending and evaluation. **[CDRL A006]**

The Contractor **shall** be responsible for designing, implementing and maintaining strict configuration management for all aspects of the evolving software and algorithms. **[CDRL A006]**

The Contractor **shall** document all software developed under this task. **[CDRL A006]**

3.2.5 Task 5 – Synthetic Aperture Radar

Synthetic Aperture Radar Synthetic Aperture Radar (SAR) and Interferometric Synthetic Aperture Radar (ISAR) techniques are being used to measure radar backscatter from the ocean surface. The radars are mounted on both ground-based and airborne platforms.

The Contractor **shall** supply mechanical engineering and electronic technician services for the radar mounts.

The Contractor **shall** design, acquire, modify, and adapt ground support equipment (GSE) to support sensor integration and test. Typical GSE elements will include: electronics for command, control, and data acquisition, and associated interfaces; support structures; wiring harnesses; and supporting design support systems. **[CDRL A005, A006]**

3.2.6 Task 6 – Fluid Flow Phenomena

The Contractor **shall** perform laboratory and field experiments and modeling and analysis to study fluid flow phenomena in the oceans and other natural bodies of water, and in laboratory test tanks. **[CDRL A0002, A0003, A0005, A0006]**

3.2.7 Task 7 – Aerosol and Cloud Processes

The Contractor **shall** test, improve and extend computer models of marine aerosols and clouds.

The Contractor **shall** perform field and field measurements of aerosol and cloud processes and of the effects of aerosols and clouds on natural and artificial optical radiation. Field measurements include surface measurements of sky radiance and direct solar irradiance.

The Contractor **shall** develop models and perform process studies to develop and evaluate algorithms for the future APS and VIIRS instruments on NPOESS and NPP. **[CDRL A0002, A0003, A0005, A0006]**

3.2.8 Task 8 – Upper Atmospheric Remote Sensing

The Contractor **shall** support the optical, electronic, mechanical and thermal design of instruments, and associated support equipment, for space-based, airborne and ground-based Instruments for remotely sensing the atmosphere above the atmospheric boundary layer, including the upper troposphere, stratosphere, mesosphere, and ionosphere.

Where warranted, the Contractor **shall** fabricate, test and calibrate the instruments and/or support equipment. **[CDRL A0002, A0003, A0005, A0006]**

The Contractor **shall** integrate upper atmospheric remote sensing instrumentation onto host platforms or vehicles. **[CDRL A0002, A0003, A0005, A0006]**

The Contractor **shall** operate upper atmospheric remote sensing instrumentation. **[CDRL A0002, A0003, A0005, A0006]**

The Contractor **shall** design, acquire, modify, and adapt ground support equipment (GSE) to support sensor integration and test. Typical GSE elements will include: electronics for command, control, and data acquisition, and associated interfaces; support structures; wiring harnesses; and supporting design support systems.

3.2.9 Task 9 – Radio, IR, and Optical Astronomy

The Contractor **shall** support the optical, electronic, mechanical and thermal design of instruments, and associated support equipment, for space-based, airborne and ground-based Instruments for radio, infrared, and optical astronomy.

Where warranted, the Contractor **shall** fabricate, test and calibrate the instruments and/or support equipment. integrate them to their host platforms or vehicles, and operate them. **[CDRL A0002, A0003, A0005, A0006]**

The Contractor **shall** integrate radio, IR, and optical astronomy instrumentation onto host platforms or vehicles. **[CDRL A0002, A0003, A0005, A0006]**

The Contractor **shall** operate radio, IR, and optical astronomy instrumentation. **[CDRL A0002, A0003, A0005, A0006]**

The Contractor **shall** design, acquire, modify, and adapt ground support equipment (GSE) to support sensor integration and test. Typical GSE elements will include: electronics for command, control, and data acquisition, and associated interfaces; support structures; wiring harnesses; and supporting design support systems. **[CDRL A005, A006, A007]**

3.2.10 Task 10 – Documentation Services

The Contractor **shall** provide technical writing and editing support as required by specific project task areas.

The Contractor **shall** develop design specifications and ICDs, test plans,test procedures, test reports, parts lists, drawing packages describing the system baseline, and operating procedures, as required by specific project task areas. **[CDRL A0005]**

The Contractor **shall** provide computer graphics support for the creation of illustrations, drawings, and other graphic material required by various programs, studies, proposals, or technical presentations. **[CDRL A006, A007]**

The Contractor **shall** participate in the development and production of proposals for new programs of opportunity.

4.0 Special Requirements

This section describes the special requirements for this effort. The following sub-sections provide details of various considerations on this effort.

4.1 Security

It is anticipated that Contractor facilities and personnel performing work under this contract must have a Secret clearance at time of the proposal submission, and must maintain the level of security required for the life of the contract. The security requirements are in accordance with the subsections below.

4.1.1 DD Forms 254 (To be provided at time of issuance of solicitation)

The Contractor **shall** be granted access to classified information necessary for performance of this contract upon contract award as specified in the basic DD Form 254. All Contractor personnel with access to unclassified information systems, including e-mail, require at a minimum a favorable National Agency Check (NAC).

4.1.2 Identification (ID) Badges and Vehicle Passes

The Government will issue ID badges and vehicle passes to Contractor personnel working at NRL and/or the BPTF site in accordance with the requirements of Paragraph 1(b) BADGES AND VEHICLE PASSES of the NRL ROSC. A favorable trustworthiness determination is required in order for nominated Contractor personnel to be granted access to NRL facilities and issued an NRL badge. NRL issued Contractor badges will be worn and readily visible at all times while Contractor personnel are on NRL facilities.

The Contractor **shall** provide all requested information required to facilitate the use and possession of badges and vehicle passes.

The Contractor **shall** ensure the immediate return of all ID badges issued to Contractor employees under any of the following conditions completion of contract, relocation, retirement or termination of an employee, or upon request of the Contracting Officer or Contracting Officer's Representative.

4.2 Safety

The Contractor **shall** comply with NRL safety requirements.

4.3 Transition

The Contractor **shall** follow the transition plan submitted as part of the Contractor's Management Plan and keep the Government fully informed of status throughout the transition period.

4.4 Government Furnished Materials

Unless otherwise specified in the SOW, all equipment to perform the tasks in this SOW will be provided by the Government.

5.0 Deliverables

The following are the deliverables identified in the preceding requirements (denoted as **[CDRL A0xx]** and listed below). Deliverable format and schedule are outlined in Attachment **TBD**. All documents **shall** be delivered in electronic form. When requested by NRL, documents to be distributed at program reviews **shall** also be provided in hardcopy form, in sufficient quantity for distribution to the attendees.

Identifier	Name	Description
A001	Monthly Cost Report	Reports current and cumulative labor expenditures.
A002	Quarterly Progress Report	Reports technical progress during the quarter and summarize any problems or concerns.
A003	Contractor On-Site Labor Report	Reports Contractor’s labor when working at NRL.
A004	Technical Reports	Reports submitted periodically for the purpose of providing technical documentation.
A005	Contract Funded Technical Tools and Data	Reports submitted periodically for the purpose of providing technical tools and data such as designs, test plans, drawings studies etc. as detailed in the remarks section of CDRL A005.
A006	Software, Algorithms, Programs, documentation instructions and Source Code	Provide copies of software and data developed under this contract.
A007	Other Data Deliverables	Provide other data deliverable not otherwise specified under any of the other CRDLs.

A008	Final Report	Summarizes the technical and scientific objectives, findings and recommendations for the entire contract period.